# Improved Energy Efficiency through Lighting Upgrades at PLDT's Internet Data Center

In the late 1990s, Roger Amper, from the Real Estate Department at PLDT, began examining ways to reduce energy consumption in PLDT facilities. Roger has taken a variety of steps to improve the energy efficiency of its lighting fixtures. His approach has evolved from simply eliminating waste in the lighting systems through delamping fixtures, to analyzing and installing advanced technologies in these systems.

The development of Roger's lighting upgrade strategies parallels the evolution in the global lighting energy efficiency market. His first approach was delamping in over-lit areas-- he removed 4 lamps from the 6 x 40W T12 fixtures with magnetic ballasts in PLDT's Sampaloc office facility in Manila. While energy use was reduces, Roger found that the lighting levels dropped too much. Lighting output decreased in proportion to the reduction in energy consumption. As a next step, Roger installed 36W bulbs with aluminum reflectors to maximize the lighting levels, the new fixtures were more efficient, but the lighting level decreases were still too much.

*Internet Data Center*

In PLDT's new Internet Data Center (IDC) Roger made a big stride in improving his lighting efficiency. Instead of just switching to a more efficient lamp, he chose a lamps and ballast system that was much more efficient. Roger replaced 40W T12 fluorescent lamps and their magnetic ballasts with four-foot, high-frequency 32W T8 lamps with high-frequency electronic ballasts in a 320 fixture demonstration project on the fifth floor. Roger followed the specifications found in the U.S. Environmental Protection Agency's Lighting Procurement Guide to make sure he equipment that would be his needs

PLDT contracted Phillips to install the lamps and ballasts at the IDC. The contract with incorporated supply, installation, and commissioning. Other provisions included complete FATL product testing, no commitment to purchase lamps if the resulting savings were less than 20 percent of the cost of installation, a five-year warranty on the electronic ballasts, compliance with U.S. EPA Commercial Lighting Procurement Guidelines. Energy savings monitoring was also set up.

| *PLDT Contractor Requirements with Phillips:* |
|---|
| ❖ No commitment to purchase if less than 20% savings |
| ❖ Lamps & ballasts not to be removed if less than 20% savings |
| ❖ 5 year warranty on electronic ballasts |
| ❖ Compliance with U.S. EPA Commercial Lighting Procurement Guide |
| ❖ Product testing by FATL |
| ❖ Installation of electric meters for monitoring and verification of savings |

Roger realized a number of benefits after upgrading the lamps to 32W T8 fixtures with electronic ballasts. 32W T8 lamps with high frequency electronic ballasts are much more energy efficient than the previous 40W T12 lamps with magnet ballasts. They have a rated lamp life that is 30% longer and produce over 10% more light. Reduced energy costs, reduced number of lamps used, improved lighting distribution and better aesthetic quality, reduced maintenance work, and reduced air conditioning operation are other benefits from the retrofit.

| *Lamp/Ballast Details* | *Before* | *After* |
|---|---|---|
| ❖ Ballast Type | 220V 2-lamp Standard Magnetic ballast | 220v 2-lamp Rapid Start Electronic Ballast |
| ❖ Lamp Type | 40W T12 | 32W T8 |
| ❖ Actual Lux | 255 | 284 |
| ❖ Rated Lamp Life | 15 000 | 20 000 |
| ❖ Color Temperature | 6200K | 5000K |
| ❖ Color Rendering Index | 65 | 75 |
| ❖ Actual Watts/fixture | 90.45 | 64.67 |

Two months after installing the new lamps and ballasts at IDC, the results were verified and the savings were found to be over 25 Watts/ fixtures or about 28%. This projects to 47,882 kWh/year or **P 215, 469.00/year, with a payback period of 2.02 years**. Additional savings are also realized through a reduction in the cooling load, as the 32WT8 lamps and electronic ballasts produced less heat.

**Lessons Learned**

One of the main challenges Roger faced during his demonstration project was the change in color temperature (visual appearance of light) from the new lamps. The original 40W T12 lamps had a color temperature of 6200K, a cool tone to which the workers were accustomed. Initially, the new 32W T8 lamps had an initial color temperature of 4000K. The change was large enough to produce a few occupant complaints. Some said it was too bright, others said it was too dim, or too red or caused eye irritation. In response to the complaints, the 4000K lamps were replaced with cooler color lamps, 32W 5000K Cool-Daylight lamps, which was acceptable to the occupants.

Fortunately, Roger had begun with a pilot project. The project was small enough that the complaints could be addressed. Roger realized that more effort would need to be spent preparing occupants for future projects.

Photograph of the Internet Data Center, Manila, Philippines

**Environmental Benefits**

In addition to tremendous financial benefits and an increase in light quality, an added benefit from lighting upgrades is the pollution savings potential. The reduction in electricity from Roger's demonstration project will reduce greenhouse gas emissions by 26,000 kg of carbon dioxide each year as well as other air pollution caused by generating electricity.

But Roger won't stop there. PLDT already has its next lighting retrofit projects planned. Roger will to install 32 W T8 lamps in PLDT buildings throughout the entire Metro Manila Building. A proposed 5000 fixture project is expected to save 1.91 million Pesos each year with a payback period of 3.5 years. Another project in development includes the use of 28W T5 lamps with electronic ballasts at a new highly efficient Call Center.

PLDT is also an environmental leader through its active employee environmental awareness campaign. In 2001, the U.S EPA recognized PLDT's efforts as a leader in energy efficiency.